



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 01:30 PM UTC

PDB ID : 6GL3 / pdb_00006gl3
Title : Crystal structure of human Phosphatidylinositol 4-kinase III beta (PI4KIIIbeta) in complex with ligand 44
Authors : Lammens, A.; Augustin, M.; Steinbacher, S.; Reuberson, J.
Deposited on : 2018-05-22
Resolution : 2.77 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

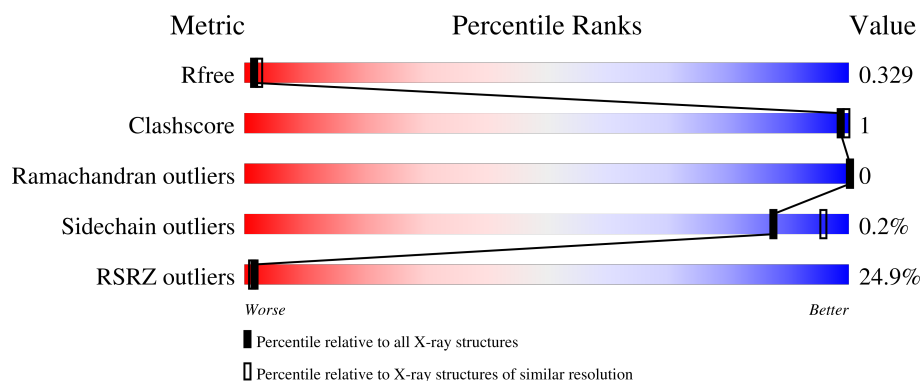
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.77 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	5248 (2.80-2.76)
Clashscore	190562	5693 (2.80-2.76)
Ramachandran outliers	187476	5590 (2.80-2.76)
Sidechain outliers	187428	5592 (2.80-2.76)
RSRZ outliers	180081	5251 (2.80-2.76)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	386	8% 90% 8%
1	B	386	34% 76% 22%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5333 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

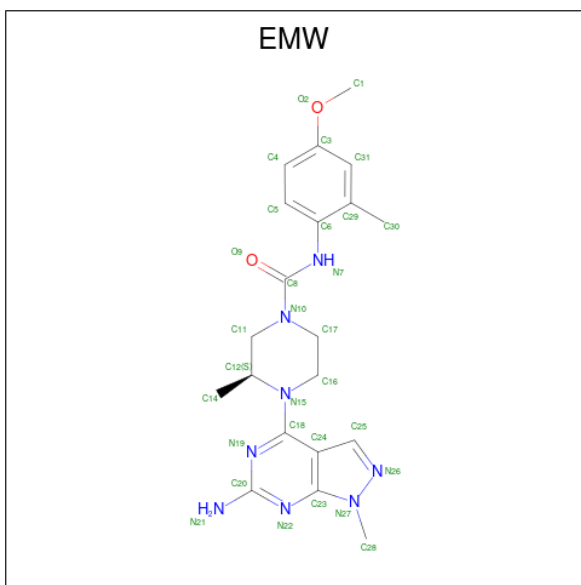
- Molecule 1 is a protein called Phosphatidylinositol 4-kinase beta, Phosphatidylinositol 4-kinase beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	354	Total	C	N	O	S	132	0	0
			2845	1821	491	515	18			
1	B	301	Total	C	N	O	S	211	0	0
			2443	1578	419	428	18			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	316	GLY	-	expression tag	UNP Q9UBF8
A	526	ASP	-	linker	UNP Q9UBF8
A	527	SER	-	linker	UNP Q9UBF8
A	528	GLY	-	linker	UNP Q9UBF8
A	529	ASP	-	linker	UNP Q9UBF8
A	530	GLY	-	linker	UNP Q9UBF8
A	531	SER	-	linker	UNP Q9UBF8
B	316	GLY	-	expression tag	UNP Q9UBF8
B	526	ASP	-	linker	UNP Q9UBF8
B	527	SER	-	linker	UNP Q9UBF8
B	528	GLY	-	linker	UNP Q9UBF8
B	529	ASP	-	linker	UNP Q9UBF8
B	530	GLY	-	linker	UNP Q9UBF8
B	531	SER	-	linker	UNP Q9UBF8

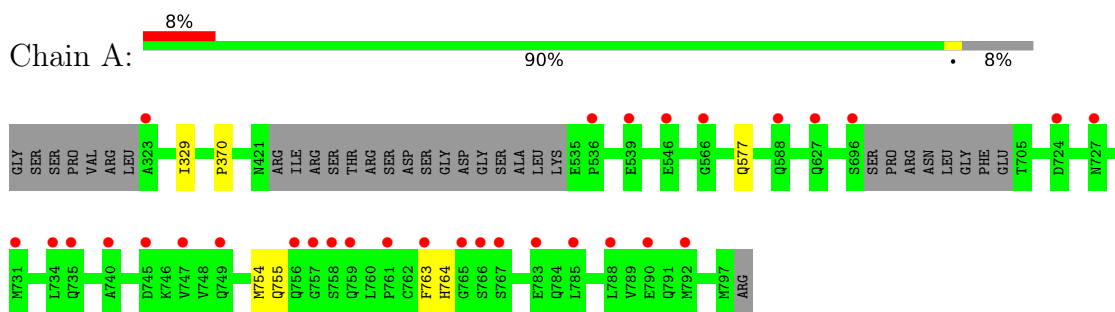
- Molecule 2 is (3 {S})-4-(6-azanyl-1-methyl-pyrazolo[3,4-d]pyrimidin-4-yl)- {N}-(4-methoxy-2-methyl-phenyl)-3-methyl-piperazine-1-carboxamide (CCD ID: EMW) (formula: C₂₀H₂₆N₈O₂).



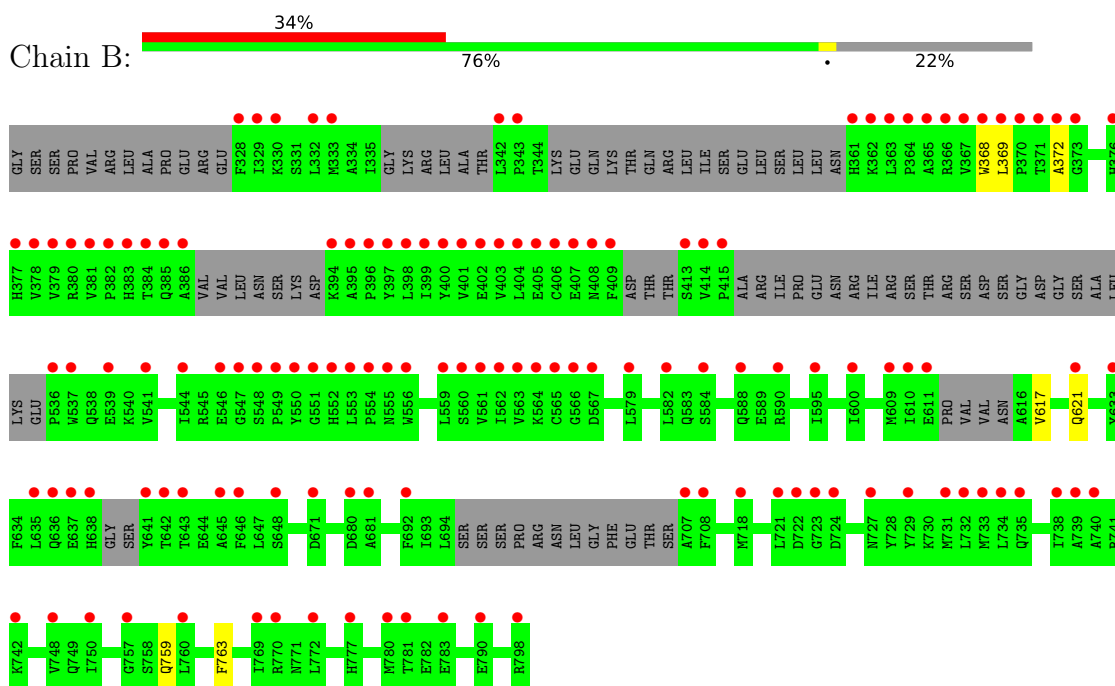
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Phosphatidylinositol 4-kinase beta,Phosphatidylinositol 4-kinase beta



- Molecule 1: Phosphatidylinositol 4-kinase beta,Phosphatidylinositol 4-kinase beta



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	64.47Å 69.48Å 172.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	86.42 – 2.77 86.42 – 2.77	Depositor EDS
% Data completeness (in resolution range)	97.0 (86.42-2.77) 97.0 (86.42-2.77)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.26 (at 2.77Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.276 , 0.333 0.278 , 0.329	Depositor DCC
R_{free} test set	742 reflections (3.63%)	wwPDB-VP
Wilson B-factor (Å ²)	52.3	Xtriage
Anisotropy	0.484	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 63.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	5333	wwPDB-VP
Average B, all atoms (Å ²)	74.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.83% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: EMW

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.80	0/2904	1.11	1/3926 (0.0%)
1	B	0.78	0/2493	1.09	4/3358 (0.1%)
All	All	0.79	0/5397	1.10	5/7284 (0.1%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	372	ALA	N-CA-C	6.55	118.08	111.07
1	B	763	PHE	N-CA-C	5.76	118.51	111.82
1	B	368	TRP	CA-CB-CG	5.66	124.35	113.60
1	B	759	GLN	N-CA-C	5.29	119.44	113.15
1	A	764	HIS	CA-CB-CG	-5.18	108.62	113.80

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2845	0	2878	4	0
1	B	2443	0	2462	1	0
2	A	30	0	0	0	0
3	A	15	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	5333	0	5340	5	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 1.

All (5) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:577:GLN:HG3	1:A:754:MET:HE1	1.91	0.52
1:A:755:GLN:HB3	1:A:763:PHE:CZ	2.49	0.48
1:A:755:GLN:HB3	1:A:763:PHE:CE2	2.50	0.47
1:B:617:VAL:HG12	1:B:621:GLN:HB3	2.03	0.40
1:A:329:ILE:HD11	1:A:370:PRO:HG3	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	348/386 (90%)	333 (96%)	15 (4%)	0	100	100
1	B	283/386 (73%)	275 (97%)	8 (3%)	0	100	100
All	All	631/772 (82%)	608 (96%)	23 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	318/345 (92%)	318 (100%)	0	100	100
1	B	270/345 (78%)	269 (100%)	1 (0%)	84	93
All	All	588/690 (85%)	587 (100%)	1 (0%)	87	96

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	369	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	408	ASN
1	A	577	GLN
1	A	684	HIS
1	B	385	GLN
1	B	571	GLN
1	B	684	HIS
1	B	756	GLN
1	B	759	GLN
1	B	784	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	EMW	A	801	-	33,33,33	1.35	4 (12%)	41,48,48	2.54	13 (31%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EMW	A	801	-	-	2/13/27/27	0/4/4/4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	801	EMW	N27-N26	3.73	1.39	1.37
2	A	801	EMW	C20-N21	2.38	1.38	1.33
2	A	801	EMW	C17-N10	2.29	1.51	1.47
2	A	801	EMW	C16-N15	2.15	1.50	1.46

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	EMW	C24-C23-N22	-9.37	120.61	126.56
2	A	801	EMW	N7-C8-N10	5.99	122.94	115.91
2	A	801	EMW	C20-N19-C18	4.32	125.09	113.51
2	A	801	EMW	C28-N27-N26	3.90	124.88	120.05
2	A	801	EMW	C28-N27-C23	-3.88	125.57	128.30
2	A	801	EMW	C24-C18-N15	3.54	128.40	122.81
2	A	801	EMW	O9-C8-N10	-3.42	116.89	121.67
2	A	801	EMW	C25-N26-N27	3.09	108.55	106.36
2	A	801	EMW	N19-C20-N22	-2.84	121.13	125.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	EMW	C24-C18-N19	-2.76	115.94	122.71
2	A	801	EMW	N21-C20-N22	2.64	121.18	117.22
2	A	801	EMW	C20-N22-C23	2.44	120.04	113.51
2	A	801	EMW	C5-C6-C29	-2.37	117.99	120.70

There are no chirality outliers.

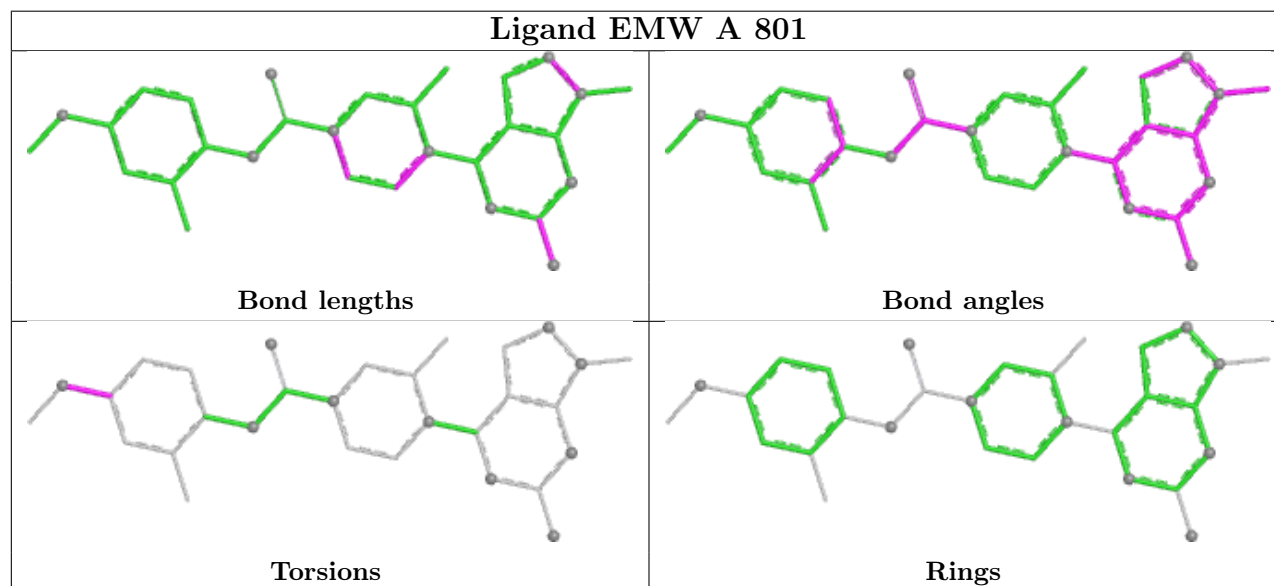
All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	EMW	C4-C3-O2-C1
2	A	801	EMW	C31-C3-O2-C1

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	354/386 (91%)	0.65	31 (8%) 15 12	22, 48, 95, 126	44 (12%)
1	B	301/386 (77%)	2.17	132 (43%) 0 0	32, 85, 129, 164	58 (19%)
All	All	655/772 (84%)	1.35	163 (24%) 2 1	22, 64, 121, 164	102 (15%)

All (163) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	397	TYR	8.4
1	B	364	PRO	8.1
1	B	363	LEU	7.6
1	B	365	ALA	7.5
1	B	386	ALA	7.0
1	B	401	VAL	6.8
1	B	367	VAL	6.7
1	B	366	ARG	6.7
1	B	368	TRP	6.6
1	B	382	PRO	6.2
1	B	369	LEU	6.1
1	B	707	ALA	6.0
1	B	740	ALA	5.9
1	B	398	LEU	5.8
1	B	384	THR	5.5
1	B	562	ILE	5.3
1	B	742	LYS	5.2
1	B	399	ILE	5.1
1	B	565	CYS	4.9
1	B	584	SER	4.9
1	B	563	VAL	4.8
1	B	377	HIS	4.8
1	B	681	ALA	4.7
1	B	409	PHE	4.7

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Mol	Chain	Res	Type	RSRZ
1	B	536	PRO	4.6
1	B	547	GLY	4.5
1	B	415	PRO	4.5
1	B	371	THR	4.5
1	B	381	VAL	4.4
1	B	385	GLN	4.3
1	B	641	TYR	4.3
1	B	643	THR	4.2
1	B	396	PRO	4.2
1	B	783	GLU	4.2
1	B	395	ALA	4.2
1	B	402	GLU	4.1
1	B	380	ARG	4.1
1	B	561	VAL	4.1
1	B	328	PHE	4.1
1	A	783	GLU	4.0
1	A	724	ASP	3.9
1	B	379	VAL	3.8
1	B	408	ASN	3.8
1	B	404	LEU	3.8
1	A	758	SER	3.7
1	B	400	TYR	3.7
1	B	550	TYR	3.7
1	B	342	LEU	3.7
1	B	383	HIS	3.7
1	A	566	GLY	3.7
1	B	405	GLU	3.7
1	A	323	ALA	3.6
1	A	766	SER	3.6
1	B	566	GLY	3.5
1	B	403	VAL	3.5
1	A	759	GLN	3.5
1	B	413	SER	3.4
1	B	378	VAL	3.4
1	B	373	GLY	3.4
1	B	559	LEU	3.4
1	B	361	HIS	3.3
1	B	414	VAL	3.3
1	B	738	ILE	3.3
1	B	553	LEU	3.3
1	B	376	HIS	3.3
1	B	588	GLN	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	727	ASN	3.3
1	B	394	LYS	3.2
1	B	555	ASN	3.2
1	A	588	GLN	3.1
1	A	749	GLN	3.1
1	B	781	THR	3.1
1	A	745	ASP	3.1
1	B	621	GLN	3.1
1	B	549	PRO	3.0
1	B	362	LYS	3.0
1	A	756	GLN	3.0
1	B	757	GLY	3.0
1	B	735	GLN	3.0
1	B	724	ASP	2.9
1	B	723	GLY	2.9
1	B	546	GLU	2.9
1	A	765	GLY	2.9
1	B	539	GLU	2.9
1	B	609	MET	2.9
1	B	798	ARG	2.8
1	B	548	SER	2.8
1	B	777	HIS	2.8
1	B	790	GLU	2.8
1	B	600	ILE	2.8
1	B	560	SER	2.8
1	A	539	GLU	2.8
1	B	729	TYR	2.8
1	B	343	PRO	2.7
1	B	329	ILE	2.7
1	B	582	LEU	2.7
1	B	552	HIS	2.7
1	B	541	VAL	2.7
1	A	731	MET	2.7
1	B	407	GLU	2.7
1	A	763	PHE	2.7
1	B	554	PRO	2.7
1	B	333	MET	2.7
1	A	747	VAL	2.7
1	B	734	LEU	2.6
1	B	611	GLU	2.6
1	B	692	PHE	2.6
1	B	708	PHE	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	671	ASP	2.6
1	B	733	MET	2.6
1	B	370	PRO	2.6
1	B	372	ALA	2.6
1	B	646	PHE	2.6
1	B	330	LYS	2.6
1	B	551	GLY	2.6
1	B	722	ASP	2.6
1	A	767	SER	2.5
1	B	732	LEU	2.5
1	B	731	MET	2.5
1	B	406	CYS	2.5
1	B	750	ILE	2.5
1	A	734	LEU	2.5
1	B	637	GLU	2.5
1	A	740	ALA	2.5
1	B	739	ALA	2.5
1	A	785	LEU	2.4
1	B	332	LEU	2.4
1	A	761	PRO	2.4
1	B	633	TYR	2.4
1	B	748	VAL	2.4
1	A	788	LEU	2.4
1	B	721	LEU	2.4
1	B	645	ALA	2.4
1	A	727	ASN	2.3
1	B	590	ARG	2.3
1	B	635	LEU	2.3
1	B	760	LEU	2.3
1	B	537	TRP	2.3
1	B	770	ARG	2.3
1	B	544	ILE	2.3
1	B	638	HIS	2.3
1	B	642	THR	2.2
1	A	790	GLU	2.2
1	A	757	GLY	2.2
1	B	564	LYS	2.2
1	A	546	GLU	2.2
1	A	536	PRO	2.2
1	B	579	LEU	2.2
1	B	648	SER	2.2
1	B	610	ILE	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	627	GLN	2.2
1	B	636	GLN	2.2
1	B	680	ASP	2.2
1	A	735	GLN	2.1
1	A	792	MET	2.1
1	B	769	ILE	2.1
1	A	696	SER	2.1
1	B	556	TRP	2.1
1	B	718	MET	2.1
1	B	595	ILE	2.1
1	B	780	MET	2.0
1	B	567	ASP	2.0
1	B	772	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

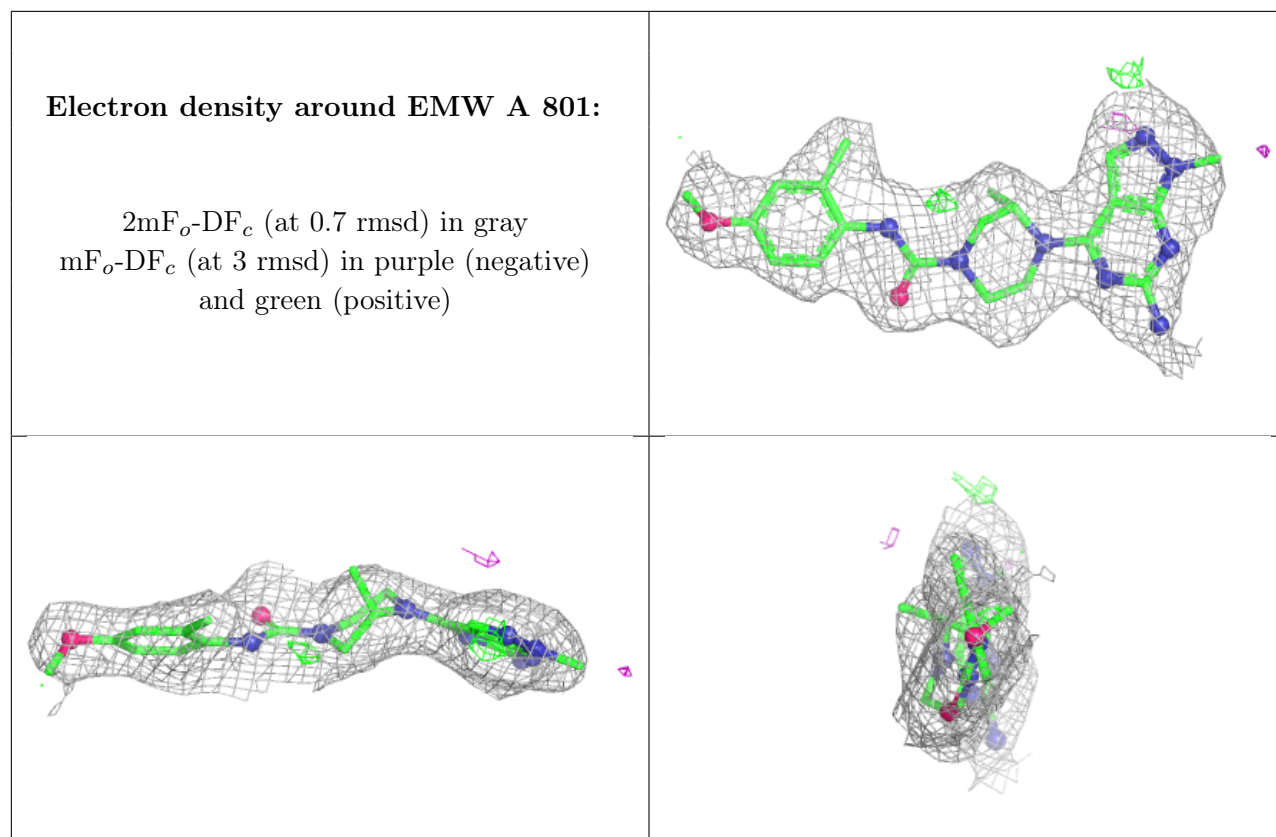
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	EMW	A	801	30/30	0.91	0.12	25,30,45,60	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



6.5 Other polymers [i](#)

There are no such residues in this entry.